2006

The Relationship between Emotional Recognition and Personality Traits

Lyndon A. Mitchell

The Relationship between Emotional Recognition and Personality Traits

Graduate Thesis

Submitted to the Faculty

Of the School Psychology Program

College of Liberal Arts
ROCHESTER INSTITUTE OF TECHNOLOGY

By

Lyndon A. Mitchell

In Partial Fulfillment of the Requirements
For the Degree of
Master of Science and
Advanced Graduate Certificate

Rochester, New York June 26, 2006

Approved: Scott P. Merydith
(committee chair)

Jennifer Lukomski
(committee member)

RIT
School Psychology Program
Permission to Reproduce Thesis

PERMISSION GRANTED
Title of thesis The Relationship between Emotion Recognition and Personality Traits.

I Lyndon Mitchell hereby **grant permission** to the Wallace Memorial Library of the Rochester Institute of Technology to reproduce my thesis in whole or in part. Any reproduction will not be for commercial use or profit.

Date: _____ **Signature of Author:** Lyndon Mitchell

PERMISSION FROM AUTHOR REQUIRED
Title of thesis _____

I _____ **prefer to be contacted** each time a request for reproduction is made. I can be reached at the following address:

_____
_____
_____

PHONE: _____

Date: _____ **Signature of Author:** _____

PERMISSION DENIED
TITLE OF THESIS _____

I _____ hereby **deny** permission to theWallace Memorial Library of the Rochester Institute of Technology to reproduce my thesis in whole or in part.

Date: _____ **Signature of Author:** _____

TABLE OF CONTENTS

Running Head: EMOTIONAL RECOGNITION AND PERSONALITY

The Relationship between Emotional Recognition and Personality Traits.

Lyndon A. Mitchell

Rochester Institute of Technology

Abstract

This study investigated the relationship between personality traits and the ability to recognize emotions from facial expressions. A sample of undergraduate and graduate students (n = 52) were administered the 16 Personality Factor Questionnaire 5th Edition (16PF-5) (Cattell, 1993) and an abbreviated version of Ekman's Pictures of Facial Affect (Ekman & Friesen, 1976). Pearson product-moment correlations revealed that the personality trait, Apprehension, was associated with the accurate recognition of most of the emotions. Further, regression analyses revealed that the recognition of fear was best predicted by the 16PF factors Dominance, Self Reliance and Apprehension. Personality differences were also identified between the various academic colleges with Engineering students scoring lowest on those traits and skills necessary for positive social interaction. Implications for counseling and recommendations for future studies are also provided.

The Relationship between Emotional Recognition and Personality Traits

It has been called the single most important body area and channel of nonverbal communication (Nowicki & Hartigan, 2001) and the most important perceptual stimulus in the social world (Simon, Rosen, Grossman & Pratowski, 1995). There is no shortage of literature, empirical or otherwise, that attests to the power of the face in relaying important emotional information. Indeed facial communication is deemed responsible for up to 90% of information conveyed in the expression of human emotion, and was found to have more weight than verbal communication in the event of a discrepancy between the two (Mehrabian & Ferris, 1967). Yet there are some individuals who miss out on integral emotional information due to their reduced capacity to correctly identify facial expressions of emotions.

Ekman (2003) states that "Emotions determine the quality of our lives." He further states that "with the ability to identify emotions early on, we may be better able to deal with people in a variety of situations and to manage our own emotional responses to their feelings"(p.xvii). Although among the leading researchers in this field, Ekman is not the first to identify the impact of the perception of emotions in others. Close to a century earlier, Darwin (1965, p.12) argued that" when we witness any deep emotion, our sympathy is so strongly excited....". There is no doubt that accurate recognition of emotion has important social functions. It draws the perceiver into a non -verbal emotional pact with the displayer, which often requires the perceiver to respond in an appropriate manner. Accurate perception may thus lead to favorable interpersonal experiences, whereas inaccurate interpretations can result in inaction and inappropriate responses. This in turn has the potential to adversely affect social interaction. Perceiving, understanding and appropriately responding to facial expressions of emotions are all important components of social interaction (McAlpine, Singh, Kendall, & Ellis, 1992).

Beyond the social benefits, research with infants also indicates that the accurate recognition of facial expressions of emotions has adaptive benefits. Darwin was the one who initially believed that this recognition ability is inborn. Subsequently, researchers have found evidence that indicate that infants as young as 12 months seek out and use an individual's facial expressions in order to get their biological and social needs met (Sorce et al., as cited in McAlpine, Singh, Kendall, & Ellis, 1992). Still others have found infants as young as three months are able to discriminate among different facial emotions (Charlesworth & Kreutzer, as cited in Simon, Rosen, Grossman, & Pratowski, 1995). These findings seem to suggest that human beings are born with the capacity to focus on facial expressions and that this ability may have evolutionary benefits.

The study of facial emotional recognition ability dates back to the early 1920's (Hall, 1978). Initial debates revolved around the fact of whether persons could recognize nonverbal expressions of emotions and whether this ability was universal. Much empirical data has subsequently been gathered attesting to the fact that human subjects can reliably identify specific emotions as expressed in faces. In particular, six basic emotions (happiness, sadness, anger, surprise, disgust and fear) involved in everyday interactions have been found to be consistently recognizable at above average rates across different cultures. Russell (1994) cites numerous studies with literate cultures (e.g., Ekman et al., 1987; Izard, 1971; Niit & Valsiner, 1977) that have found overwhelming evidence that emotions are recognized at above chance levels across cultural and geographic boundaries. According to Russell, persons from different countries, including the United States, Germany, Turkey, Argentina, Brazil, and Japan, were asked to indicate which emotions were being expressed in a series of photographs. The similarity of

judgments, regardless of where participants came from, sought to explain the universality of facial expressions.

Ekman's work with preliterate, isolated cultures in New Guinea lends additional evidence to the universality argument. He found that these people had similar facial expressions as literate cultures for the six basic emotions. These people were also able to match the pictures of American faces with specific emotions with high rates of accuracy, despite never having contact with persons beyond their culture (Ekman, 2003).

On the other end of the spectrum are those researchers, such as Mead and Birdwhistell, who support the notion that emotional expressions are learned and culturally specific (Birdwhistell, as cited in Ekman, 2003). They point to the fact that in many of the studies that found universality, emotion recognition ability appeared to be more accurate when members of the same cultural group that expressed the emotional stimuli also makes the judgments (Elfenbein & Ambady, 2003a). For example, Matsumoto (as cited in Russell, 1994) found in a study of five cultures, that Americans outperformed the other four cultures when looking at faces of American stimulus. This in-group advantage was also confirmed through a number of meta-analyses with participants from different cultures (Elfenbein & Ambady, 2003b).

There is room for compromise on this debate, however. There is undoubtedly overwhelming evidence for the universality theory provided by Ekman and others, however there is also sufficient evidence to suggest cultural variations in the expressions of certain emotions, which subsequently lead to differences in recognition ability. Cultural variations could be accounted for by accepting that some expressions such as "laughing with joy and tears in grief" (Russell, 1994) are universal while some expressions have variations based on culture. Elfenbein and Ambady (2003b) suggest the term "emotional dialects" to explain how different cultures

may have subtle differences in how their faces communicate emotion. Interestingly enough, they found that the in-group advantage was lower when groups were nearer geographically or had greater cross-cultural exposure to each other.

Group differences in emotional recognition ability

Having established the universality of human being's ability to recognize emotions from faces, more recent research has focused on finding correlates with this ability. Other than the differences attributed to cultural exposure stated earlier, certain individuals show lower rates of accuracy than what has come to be expected. Gender was one of the first variables to be measured in relation to recognition ability. Meta analytic research has found that women are moderately superior to men in this ability (Hall, 1978). More recent research has duplicated these findings suggesting that women may be better at recognizing emotions based on their greater tendency to accommodate others and their subordinate role in the larger culture (Elfenbein et al., 2002).

Eiland and Richardson (1976) found that female expressions are not only judged differently from male expressions but also carry more emotional information. They found that children and adults alike judged female pictures differently than they did male pictures, regardless of the age or sex of the photographed subject. Dimitrovsky et al. (2000) found that learning disabled children were more accurate in identifying emotional expressions from female faces than they were at interpreting male faces. The implications of this they suggest could lead to social skills training using female models or teachers. However, this may not necessarily lead to generalizations when these children have interactions with males.

Another group of persons who have been found to exhibit deficiencies in facial recognition of emotions are those with psychological and psychiatric disturbances. Individuals

with schizophrenia and anorexia nervosa both show significantly impaired recognition when compared to normal subjects (Feinberg, Rifkin, & Schaffer, 1986; Kucharska-Pietura, Nikolaou, Masiak, & Treasure, 2004). Persons with mood disorders such as depression may be impaired in several ways. Not only are they less accurate, but they may be slower to process and respond to facial expressions and are more likely to label an expression with a negative emotion when it was incorrectly recognized (Persad & Polivy, 1993; Feinberg et al., 1986).

Another area of research that has implications for the school setting is based on the findings that children with mental retardation, autism and learning disabilities show lower accuracy rates than their regular education peers (Adams & Markham, 1991; Dimitrovsky, Spector, Levy-Shift, & Vakil, 1998). Dimitrovsky, Spector, Levy-Shift, and Vakil (1998) found in their study of Israeli third through sixth graders that not only were learning disabled children less accurate at identifying emotions, but that the subgroup of nonverbal learning disabled children were even more disabled than children with verbal learning deficits. Although this task called for the labeling of adult facial expressions rather than the participants same age peers, the differences were noticeable and significant to suggest a deficit in this population of students.

Life experiences are another set of factors that have implications for one's ability to recognize emotions. As already mentioned familiarity with a specific culture increases the ability to distinguish emotions from their faces. It also seems that individuals of a higher socioeconomic status perform better on tests of facial expression than lower SES individuals (Izard, 1971). Another area that has received attention is the effect of early neglect and abuse on children's ability to recognize emotions. Pollak, Cicchetti, Hourung, and Reed (2000) in their study of preschoolers found that not only did neglected children show lower recognition rates than their nonmaltreated or physically abused counterparts, but they also had greater trouble discriminating

between the basic emotions. Children who were physically abused showed a heightened awareness of angry cues. Overall it was found that maltreateatment seems to affect children's understanding of particular emotional displays.

Based on this research, there is definite evidence that being male, having certain psychological and psychiatric states, and physical abuse and neglect make one susceptible to inaccurately reading emotions in the faces of others. This may explain in part the range of social and interpersonal difficulties that affect a number of these individuals.

Correlates of emotional recognition ability

The relationship between emotional recognition and personality has been less firmly established. Attempts to measure this relationship have sought to establish correlates between emotional recognition and Self-Monitoring- the tendency to take one's social cues from observing the appropriateness of others, finding a positive correlation between high self monitors and recognition accuracy (Snyder, 1974). Others like Nowicki and Hartigan (1988) found that having an internal locus of control was a significant predictor of greater accuracy in recognizing emotional expressions.

Researchers who adhere to the Big Five factor model of personality have added significantly to this area of research by comparing persons' recognition ability on a wider range of traits that have direct bearing on social interaction. Such traits include Extraversion, Anxiety/Neuroticism, Self-Control/Conscientiousness, Openness to Experience and Independence. Considering that Extraversion is associated with stimulation seeking from others and the environment, it is to be expected that extraverts should be better at processing emotional data from others. The same can be anticipated for those open to new experiences. Matsumoto and his colleagues also suggest that conscientious personalities should be better at recognizing

emotions due to their attentiveness to detail. Conversely, neurotic persons tend to be emotionally avoidant for fear of experiencing negative emotion, and as such may avoid the recognition and awareness of others' emotions (Matsumoto et al., 2000).

Mann and his colleagues tested such hypotheses and in one study found that emotional recognition ability was positively correlated with the trait Agreeableness and negatively related to Anxiety (Mann, Wise, Trinidad, & Kohanski, 1994). More recently however, Matsumoto and his colleagues found in a series of studies that emotional recognition ability was consistently positively correlated with Openness and Conscientiousness, however only one study was able to find a correlation between Extraversion or Neuroticism and recognition ability (Matsumoto et al., 2000). Although there appears to be some evidence of a relationship between emotional recognition and the personality traits of Openness to new experiences and Conscientiousness, the relationship with Extraversion and Anxiety remains less firmly established.

Measuring Emotional Recognition

Key to this topic of emotional recognition is an examination of the methodological issues inherent in its measurement. Given the potential for a high level of subjectivity, the validity of past and any future studies in this area is highly incumbent on the ability of the measurement instruments and procedures to present objective and verifiable results. Two issues related to measurement are the stimulus characteristics and response format.

To date the most frequently utilized pictures of facial affect are those developed by Ekman and Friesen in the 1970's. They identified six basic emotions that people can identify from facial expressions with a high degree of accuracy. Their set of pictures displayed happiness, sadness, fear, surprise, disgust and anger poses, as well as neutral expressions. These photographs are all of adult Caucasian models in posed expressions. Part of the reason for the

popularity of these pictures is because of the rigorous methods employed by the developers. Posers were trained to either contract or relax certain facial muscles associated with different facial expressions. From over 3000 original pictures, Ekman and Friesen chose 110 which consistently were judged to represent the emotions as theorized by the authors (Russell, 1994). The reliability of these pictures has also been proven through interrater agreement scores that range from 70% to 100% (Dimitrovsky, Spector, & Levy-Shift, 2000).

There are however some external validity issues related to these pictures. The fact that these are all adult, Caucasian stimuli precludes valid assessment with different age groups or different races. Although other experimenters have sought to develop their own set of pictures to assess these populations (e.g. Eiland & Richardson, 1976; Tremblay, Kirouac, Dore, 1987), these lack the validity and reliability as seen in Ekman's pictures.

Another issue arises regarding the posed nature of the stimulus pictures. Several researchers have argued that persons recognize spontaneous real life expressions differently than they do posed expressions. Reuter-Lorenz and Davidson's study (as cited in Russell, 1994) found that subjects could tell when expressions were posed. They argue that "posed expressions might be exaggerated or stylized" and that "the poses for each type of expression might be more similar to each other, and more discriminable from other types of expression, than spontaneous expressions". However there have been no cross cultural studies using spontaneous expressions, and a lack of an objective method for scoring spontaneous facial expressions does not allow for arguments of this methods utility.

Another key methodological issue is the response format utilized in emotion recognition tasks. Most tests of emotional recognition require participants to categorize pictures by selecting one word from a prescribed list of emotion labels. This *forced choice* method is a common

practice in research on emotion and has been advocated as the method of choice in the study of facial expressions (Russell, 1994). This method has implications in assessing the construct validity of the measure. It has been argued that providing a list of emotions cues the observer to think in terms of specific categories. There is also the argument that emotions seldom fall into mutually exclusive categories and that sometimes subjects place the same emotion into more than one category based on their own experience.

Although the forced choice method has faced several criticisms, it continues to be the most frequently used format for measuring emotional recognition. The frequent use of this method is also indicative of the failure of other measures to provide reliable and valid findings. Other methods most frequently used include the *free label* method, where participants generate their own labels for pictures. The methodological problems with this method are numerous. Firstly, observers do not always give a specific emotion. Frijda (as cited in Russell, 1994) examined this open ended approach and found that the majority of responses did not mention emotions at all, but rather described situations. Using this method, Izard (1971) also obtained 224 different words or phrases produced (at least twice) for eight types of expressions. This approach has significant reliability issues and Russell (1994) sums up the flaws with this approach by stating "scoring freely produced labels creates a trade off: higher recognition scores can be obtained by broadening the cluster of labels that count as correct. The experimenter can specify one particular emotion… but at the cost of reduced recognition scores" (p.120)

Another widely employed method with younger participants is the Dashiell method (Russell, 1994). This involves the use of vignettes to relay the emotion, after which the participant would select the picture that best captures the meaning of the story. Ekman used this method during research with isolated, preliterate cultures. The rationale behind this method is

that emotions do not happen outside of a context and that younger children relate better to stories. The major problem with this approach is in the selection of vignettes. Participants' own history may lead them to select a particular picture not intended by the researcher, raising the question of the internal validity of this response mode.

In spite of these methodological issues, the study of emotional recognition continues to forge ahead and has equipped the field of psychology with insight into individual and group differences in this ability. Such findings have enormous implications for education, employment and a number of realms for which social interactions are required.

Measuring Personality

Any attempt at providing evidence for differences in recognition ability due to personality traits would need to utilize well- established measures, which have the capacity for replication. One measure of personality traits with empirical support for validity is the 16 Personality Factor Questionnaire 5th Edition (16PF-5) (Cattell & Schuerger, 2003). This self report measure's major strength lies in its ability to measure personality along five distinct dimensions: Extraversion, Anxiety, Tough-Mindedness, Independence and Self-Control. These global factors are comprised of sixteen primary factor scores, some of which contribute to more than one global factor (see figure1). For example the primary factor Vigilance is associated with both the Anxiety and Independence global personality factors and the primary factor Practicality contributes to both the global factors Self-Control and Tough-Mindedness.

The 16 PF has shown stable internal consistency coefficients, ranging from .68 to .87 for the various factors (Cattell & Schuerger, 2003). The 16 PF also has good factorial validity that has been confirmed in numerous studies (e.g. Conn & Rieke, 1994; Hofer, Horn, & Eber, 1997, as cited in Cattell & Schuerger 2003). Concurrent construct validity has been proven as the 16PF

measures up well against other five factor models such as the NEO Personality Inventory Revised (NEO PI-R) (Rossier, Meyer de Stadelhofen & Berthoud, 2004).

Other variables that make the 16PF a preferred instrument to measure personality, especially as it relates to emotional recognition, is its availability in several languages and the extensive research showing its usefulness in a wide range of settings. Research with different populations has consistently shown the power of this instrument to determine certain traits associated with specific profession. Researchers found that police applicants were found to be high in Independence, Self Control and Tough Mindededness (Lorr & Strack, 1994) and applicants to the priesthood were bright, sensitive, trusting and emotionally stable (Plante, Manuel & Tandez, 1996).

The scores on the 16PF are also particularly useful as it allows the assessment of the role of personality in the prediction of occupational fit. Cattell and his colleagues in the development of this instrument sought to include and develop profiles for different occupational settings (Cattell & Schuerger, 2003). For example, a school counselor or psychologist would show a better fit for their job if they are higher on warmth and sensitivity, whereas an electrician or pilot would show a better fit if they showed more logical, practical and less interpersonal. Adding even more to the usefulness of the 16PF profiles in determining occupational fit, is its general consistency with Holland's six personality types that coincide with occupational interests (Holland, as cited in Cattell & Schuerger, 2003). Multiple regression analyses found that Extraversion was positively related with persons with Social and Enterprising interests, and negatively related to persons with Realistic and Investigative interests. Tough-mindedness was a predictor of all types except Enterprising. Independence was positively predictive of Enterprising

and Realistic personalities and Self Control was a negative predictor of Investigative and a positive predictor of Conventional interests (Schuerger, 1995).

As both emotional recognition ability and personality play such significant roles in social interaction, it is important to examine the relationship between these two variables. Also, given the scarcity and inconclusiveness of current research which attempted to establish a relationship between these two constructs, replication studies are also required. As such this current study seeks to address some of the inconsistent findings by utilizing two well established, validated measurement instruments- the 16PF-5 and Ekman's Pictures of Facial Affect with a University population, to answer a number of research questions: What is the relationship that exists between personality and emotional recognition? Are extraverts and those open to new experiences better than introverts and tough minded individuals in recognizing emotions? Does having an Anxious personality negatively impact on recognition ability?

Also, given that personality characteristics are a major determining factor in vocational choice, the results of the 16PF should provide additional data on the usefulness of the 16PF in predicting academic and occupational interests. As such a secondary goal of this research would be the determination of specific personality profiles that would be attracted to different academic disciplines. It is hypothesized that students involved in disciplines that have a high social interest (e.g. psychology, business, and media) would score higher on Extraversion. Conversely, students in the College of Engineering and Computer Science whose discipline requires fewer opportunities for social interaction and is characterized by problem solving and conceptual thinking, will score lower on Extraversion and higher on Independence. The former students would fit Holland's Social type whereas the latter are similar to Holland's Investigative type.

Finally, this study will also examine whether there are differences in emotional recognition ability by college major.

Findings from this study will add statistically valid input into the pool of research on the relationship between these two variables, and allow for future exploration and replication with other populations. Findings will also allow for further understanding of individual differences in social interaction and recommendations for more fulfilling interpersonal relationships.

Method

Subjects

Participants in this study were 52 undergraduate and graduate students from a private University in western New York. Participants were recruited primarily from an undergraduate self-taught, introduction to psychology class, and were awarded extra credit in the class for participating in the study. This class was open to students from all academic disciplines. The remainder of the participants were recruited through the use of posters strategically placed in the various academic colleges. Participation was strictly voluntary and as an incentive for participation, subjects who completed the study were eligible to win one of four $30 cash prizes. The sample was 67.3% males (n = 35) and 32.7% females (n = 17) and approximated the current male to female ratio at the college (68% males and 32% females). Participants had a mean age of 20.7 years and a mean GPA of 3.06. Subjects were recruited from over 20 different majors and were classified according to their college of registration into seven groups- Liberal Arts (n = 15), which comprised of psychology, economics and criminal justice majors, Science (n = 5), Engineering (n = 7), Computing and Information Sciences (n = 10), Applied Sciences and Technology (n = 5), Business (n = 6), and Imaging Arts and Science (n = 4).

Materials

An abbreviated version of Ekman and Friesen's (1975) pictures of facial affect (AEFER) provided the stimuli for the emotion recognition task. Forty slides of adult, Caucasian faces were shown to the participants. These represented standardized poses of the six basic emotions: happy, sad, angry, surprise, fear and disgust, as well as pictures showing a neutral emotion. Those pictures selected were those with the highest inter-rater reliability as reported by Ekman and Friesen. Inter-rater reliability range from 70% to 100% for these basic emotions and it is

reported that the validity of the test is maintained with a subset of 36 pictures (Dimitrovsky et al., 1998). Six slides each, of the emotions, neutral, happiness and surprise was used. There were seven pictures of disgust and five photographs each, of the emotions, fear, anger and sadness. Each emotion was assigned a number on a scale of 1 to 7 with happiness = 1, sad = 2, anger = 3, surprise = 4, fear = 5, disgust = 6 and neutral = 7. Participants who correctly identified the emotion were given a score of 1 for that item and 0 for an incorrect response.

The 16 Personality Factor Questionnaire Fifth Edition, (16PF-5) (Cattell, 1993) was administered to obtain descriptions of personality patterns. This 185-item questionnaire is a comprehensive, standardized, measure of normal personality that is widely used in industrial and educational settings. It is a self administered, untimed and objectively scored personality inventory providing a profile on 16 primary factors: Factor A (warmth), Factor B (reasoning), Factor C (emotional stability), Factor E (dominance), Factor F (liveliness), Factor G (rule-consciousness), Factor H (social boldness), Factor I (sensitivity), Factor L (vigilance), Factor M (abstractedness), Factor N (privateness), Factor O (apprehension), Factor Q1 (openness to change), Factor Q2 (self-reliance), Factor Q3 (perfectionism) and Factor Q4 (tension). In addition, the 16 primary factors can be combined to form five global factors, namely, Extraversion, Anxiety, Tough-Mindedness, Independence and Self-Control. Further these primary factors can be used to determine a number of interpersonal and social skills along which respondents can be compared. Scores on the 16PF are stens (standard ten) with a mean of 5.5 and standard deviation of 2.0. Scores of three and lower are considered "low" and scores of eight and higher are "high". Scores between four and seven and considered to be within the average range.

The 16PF-5 has adequate internal consistency, at both the primary and secondary levels. Alpha coefficients range from .68 on the primary factors Dominance and Openness to Change to

.87 on the factor Social Boldness. The 16 PF-5 also shows temporal stability. Test-retest reliabilities on the primary scales range from .69 on Reasoning to .87 on Social Boldness over a two week period, and from .56 on Vigilance to .79 on Social Boldness over a two month interval. The global scales have acceptable reliabilities as well, ranging from .70 on Anxiety to .82 on Tough-Mindedness over a two month period. (Cattell & Schuerger, 2003).

Procedure

Data was collected on the 16PF-5 and AEFER over a number of weeks, as participants were recruited. Informed consent was sought and participants were given information as to the nature of the study, the time required for participation (approximately 45 minutes) and the availability of counseling services at the University Counseling Center in the event that the items on the 16PF-5 caused any discomfort. At the conclusion of the briefing, participants were assigned a number, which they placed on each answer sheet, so as to preserve anonymity.

Participants were then asked to complete a brief questionnaire seeking demographic information such as age, sex, GPA and level in college. Once completed, participants were then given the AEFER. Given the fact that testing occurred based on students' availability, this task was administered individually as well as in small groups. Subjects were given pencils and answer sheets. Each item on the answer sheet had seven options corresponding to the seven emotions. These options were maintained in the same order for all items (see appendix A). The following instructions were subsequently read to the participants: "You are about to see a number of faces displaying different emotions. In front of you, you have an answer sheet with 40 items. Each item has seven options- happy, sad, angry, surprise, fear, disgust and neutral. You are to circle the emotion that best describes the picture shown. Each slide is numbered so you can follow. Each picture will only be displayed for 10 seconds, so you need to quickly make your

decision. Any questions?" For group settings, the participants were tested in a dark room with the faces expressing the emotions projected onto a screen. For individual testing, participants viewed the same images on a computer screen. The images were placed on a timer system and changed after 10 seconds. The same order for the photographs was used for both types of testing sessions.

Participants were then given the 16PF-5 questionnaire and told to complete and return it to the examiner within a two-week period. Participants were advised that they would only be eligible for the prizes on completion and return of the personality questionnaire. Of the original 60 participants who completed the recognition task, 86.6% (n =52) returned the completed 16PF. The emotion recognition data was discarded for those who did not return or complete the personality questionnaire.

Analyses

To answer the research questions, a number of analyses were conducted using the Statistical Package for the Social Sciences, version 11.0 (SPSS 11.0). Analyses included: (a) the use of descriptive statistics (means and standard deviations) to describe the sample; (b) conducting two one-way analysis of variance (ANOVA) with gender and college as the independent variables and emotion recognition ability and personality as the dependent variables; (c) computing correlation coefficients between scores on the AEFER and personality factors and (d) multiple regression analyses with emotional recognition ability as the dependent variable and personality factors as the independent variables.

Results

Personality

Due to the fact that gender differences have been observed on the 16PF (Cattell & Schuerger, 2003), t-tests were conducted to determine whether gender differences were also present in the current study. Four of the primary personality factors were found to differ significantly between the sexes. Females in this sample scored significantly higher than their male counterparts on factor A (Warmth), (t_{50} = -2.36, p =.02) and factor H (Social Boldness), (t_{50} = -2.16, p = .03). Male participants, on the other hand, scored significantly higher than females on factor N (Privateness), (t_{50} = 3.39, p = .001) and factor M (Abstractedness), (t_{50} = 2.06, p = .04).

Table 1 provides the mean sten scores and standard deviations on the 16PF-5 primary factors by gender. Mean scores fell in the average range and as such are consistent with scores that are to be expected in a normal population. Overall, participants in this study were highest on factor B (Reasoning), (M = 6.6) and lowest on factor G (Rule-Consciousness), (M = 4.0). Both sexes had these factors as their highest and lowest scores. Factor L (Vigilance), however tied with Reasoning as the highest score for males.

Table 2 presents the means and standard deviations for men and women's scores on the 16PF global factors. Overall, participants were highest on Anxiety (M = 6.3) and lowest on Self-Control (M = 4.1). The global factor Extraversion provided the only significant gender difference with females rating themselves as more extraverted than males, (t_{50} = -3.001, p = .004).

In order to address the research question of whether group differences in personality occur across different academic majors, subjects were classified into seven categories. Participants were coded as belonging to one of seven colleges: Liberal Arts, Science,

Engineering, Computing and Information Sciences, Applied Science and Technology, Business or Imaging Arts and Sciences. These represent the university's own classification system of students based on their college major.

Means and standard deviations for the 16PF primary factors were calculated for each college on every factor and are presented in Table 3. Generally scores fell in the average range, which is expected in a normal population. Students in the college of Imaging Arts and Sciences however showed some deviation on a number of factors. Scores on the factors Liveliness (M= 8.0) and Abstractedness (M = 7.5) were greater than one standard deviation from the mean and as such higher than what is to be expected in a normal population. Scores on Rule-Consciousness (M = 2.5) fell below the average range for a normal population for this college as well as students in LA (M= 3.4). Participants in the college of Science (M = 7.8) also showed a mean that was greater than one standard deviation from the mean.

A one-way ANOVA revealed significant mean differences between college groups on the primary factors Liveliness, $F(6, 45) = 3.55, p < .01$, and Rule-Consciousness, $F(6, 45) = 2.43$, $p < .05$. These differences were further probed using the Newman-Keuls post hoc analyses. This revealed that on the factor Liveliness, mean sten scores for Engineering students (M = 4.9), differed significantly from the mean sten scores for students in Imaging Arts and Sciences (M = 8.0) and Applied Science (M = 7.4). Imaging Arts students were also significantly higher on Liveliness than Computing and Information sciences students (M = 5.3). On the factor, Rule-Consciousness, mean sten scores of students enrolled in Business (M = 5.2) were significantly higher than those for persons in Imaging Arts (M = 2.5).

The differences between college groupings on the global sten score factors were also examined. Means and standard deviations are displayed in Table 4. Groups differed significantly

only on the Extraversion factor, F (6, 45) = 3.07, $p < .01$. Post hoc analyses revealed that the mean sten scores of students in the college of Engineering (M = 3.4) was significantly lower than the mean scores of students in both Applied Science (M = 6.4) and Imaging Arts (M = 6.8) on this factor.

Previous research on the 16PF has indicated that a number of interpersonal and social skills can be identified through grouping different primary personality factors (see figure 3). These factor groupings provided another means of comparison of participants. A one way ANOVA revealed significant mean differences between the colleges for Emotional Sensitivity, F (6, 45) = 3.12, $p < .05$, Social Expressivity, F (6, 45) = 3.52, $p < .01$, Empathy, F (6, 45) = 2.84, $p < .05$ and the Social Skills Inventory F (6, 45) = 2.89, $p < .05$. Newman-Keuls post hoc analyses revealed that the mean sten scores for Engineering students were significantly lower than the mean sten scores for Imaging Arts students for three of these areas: Social Expressivity, Empathy and the Social Skills Inventory (see Table 5). The mean scores for Engineering students (M= 4.2) was also significantly lower than the mean scores for students in Liberal Arts (M= 5.8), Applied Science and Technology (M= 5.8) and Imaging Arts and Science (M= 6.2) on Emotional Sensitivity.

Emotion Recognition Ability

Figure 3 provides the accuracy rates for the overall recognition of the seven emotions by gender. Inspection of the data presented in Fig. 3 indicates that the sample had high rates of accuracy, with a mean overall accuracy rate of 81.2%. Happiness was the most easily recognized emotion with overall accuracy at 98.7%. Female participants were 100% accurate in recognizing this emotion, while males identified happiness correctly 98.7% of the time. Surprise received the

second highest overall accuracy rates followed by anger, neutral, disgust, fear and sadness. There were no significant gender differences in emotion recognition ability.

To address the second research question of whether differences exist across colleges in recognition ability, a one-way ANOVA was conducted with college as the independent variable and recognition accuracy as the dependent variable. These analyses however revealed no significant differences between the colleges in emotional recognition ability.

To answer the main research question of whether there exists a relationship between personality and emotional recognition ability, Pearson correlation coefficients were calculated. Table 6 shows the correlations between the 16 PF-5 primary factors and the AEFER scales that were significant at the .01 and .05 levels and those that approached significance at the .10 level. Overall, the correlations between these two constructs were weak to moderate, with only a few of the personality factors having significant predictive power. Perfectionism was positively correlated with the recognition of happiness ($r = .33, p < .05$) and disgust ($r = .28, p < .05$). Self-Reliance and Dominance were both negatively correlated with the recognition of fear ($r = -.44, p < .01$; $r = -.37, p < .01$ respectively). Apprehension was positively correlated with the recognition of neutral ($r = .31, p < .05$) and was the only factor to correlate with overall emotional recognition ability ($r = .29, p < .05$).

Table 7 presents the global factors that significantly correlated with emotional recognition ability. Extraversion was positively correlated with the recognition of fear ($r = .34, p < .05$). Anxiety was positively correlated with the recognition of neutral ($r = .32, p < .05$) and Independence was positively correlated with the recognition of happiness ($r = .29, p < .05$).

Correlations between the emotion recognition scores and the interpersonal skills revealed significant effects for the recognition of three of the emotions (see Table 8). The recognition of

happiness correlated with several of the interpersonal skills: Social Expressivity ($r = .31, p < .05$), Emotional Expressivity ($r = .38, p < .01$), Leadership ($r = .29, p < .05$) and Something about myself ($r = .29, p < .05$). The recognition of a neutral emotion correlated with Social Sensitivity ($r = .38, p < .01$), Social Expressivity ($r = -.29, p < .05$) and Empathy ($r = -.29, p < .05$). The recognition of fear correlated with Emotional Sensitivity ($r = .28, p < .05$) and Empathy ($r = .32, p < .05$).

AEFER scales were individually regressed on to the primary and secondary personality factors, to determine which of the personality factors best predicted the recognition of each of the seven emotions. A significant multiple R was obtained only for fear, $R = .74$, $F(16, 35) = 2.72$, $p < .01$. The 16PF-5 primary factors accounted for 55% of the variance for the recognition of fear. Primary factors were then entered as a block. Significant beta weights however, were observed only for Dominance ($t = -2.32, p < .05$), Apprehension ($t = 2.49, p < .05$) and Self Reliance ($t = -2.34, p < .05$) (see Table 9). Multiple regression analyses with the global scales indicated that none of the global factors proved to be significant predictors.

Discussion

This study sought to add to the existing research on the individual topics of emotion recognition and personality, as well as the relationship between these two variables. Previous research seeking to establish a relationship has been limited and has provided the field with varying findings. The results of this study have provided in part some confirmation of previous research findings as well as new information that can add substantially to the field.

In terms of emotional recognition ability, results indicated an overall high degree of accuracy, while establishing no significant differences in terms of gender or academic discipline. The high degree of accuracy is consistent with the previous research that has established that emotions expressed by the face are universally recognized at above chance levels, with happiness being the most easily recognizable (Russell, 1994; Simon, Rosen, Grossman & Pratowski, 1995). The more negative emotions were less easily identified, with sadness being the least accurately identified emotion. Mann, Wise, Trinidad and Kohanski (1994) suggest that these negative facial expressions of emotions may differ in identifiability, due to the complexity of the structural composition of the face during their expression.

On the other hand, contrary to previous meta-analytic research which indicate women's superior ability in recognizing emotions from faces (e.g. Hall, 1978; Rotter & Rotter, 1988), this study found only a slight, but insignificant advantage for women. This study was also not able to establish differences in recognition ability by academic major. Researchers like Morgado, Cangemi, Miller and O'Connor (1992) previously found that persons engaged in people oriented activities were better at recognizing a number of emotions. Unlike this study which utilized student participants, those findings established differences with professionals with over three years work experience, which suggests that this ability may be impacted upon by exposure.

Greater differences were found in the personality profiles across academic disciplines. It was hypothesized that students who were Extraverted (outgoing, emotionally responsive and attentive to others) would be attracted to disciplines that involve a high level of social interest, such as psychology, business and media. Conversely persons attracted to colleges with a low social interest focus, such as Engineering and Computer Science would be lower on Extraversion and high on Independence (more withdrawn, impersonal and serious). This hypothesis was partially supported, as Engineering majors were indeed lowest on Extraversion and significantly more introverted than students in Imaging Arts and Applied Sciences. Differences in the personality trait Independence were not however established.

A clearer picture of the personality differences of Engineering majors can be ascertained by examining the college differences on the personality-determined social skills. Engineering majors were also seen as being at risk for not possessing a number of those skills, which facilitate positive, reciprocal, social interaction. Although not showing up as being significantly impaired on the emotional recognition task, their ability to receive and interpret all nonverbal communication, as measured by Emotional Sensitivity, was significantly poorer than that of all other groups of students. They were also lowest on both Social Expressivity, which measures skill in verbal expression and the ability to engage others, as well as Empathy. Empathy in particular reflects the individual's ability to respond in an emotionally supportive manner to the distress signals of another. All of these skills are without a doubt critical to successful social interaction and these findings begin to hint at a group of individuals who may be impaired in those skills and traits that allow one to "move toward others for emotional closeness, attachment, and connection" (Cattell & Schuerger, 2003, p. 43).

These findings not only provide additional data supporting the usefulness of the 16PF-5, but it also provides information that can be useful in a number of counseling settings. These findings provide guidance and career counselors with a profile of the type of personality that would be attracted to certain academic disciplines. Future studies may want to explore the relationship between these personality traits and satisfaction with and success in certain fields. Secondly, these findings may benefit counselors in addressing clients' interpersonal or social concerns.

The main research question that sought to address the relationship between emotional recognition ability and personality traits provided some unique findings regarding personality profiles that both enable and impede the recognition of certain emotions. Unlike previous studies that found correlations between specific global factors and total emotional recognition, this study found that the primary factors were better predictors of emotional recognition for specific emotions. Ten of the sixteen primary factors had moderate correlations with at least one of the emotions. In particular, the primary personality trait, Apprehension, deserves special attention, as this factor positively correlated with the recognition of three of the emotions and was the only factor to correlate with total emotional recognition.

This trait plays a significant role in the global scale Anxiety. Persons high in apprehension tend to be insecure, self doubting, overly concerned about how they are perceived in social situations and often consider the consequences of their actions, especially their effects on other people (Cattell & Schuerger, 2003). As such they may be more apt to noticing other's reactions to them for fear of acting inappropriately. These persons share some similarities to persons high in Self-Monitoring as found in Snyder's (1974) study. These high self-monitors, take their cues of what constitutes appropriate behaviors in a particular situation, from the

behaviors of others. They were found to be better at recognizing emotions in others than low Self-Monitors, as they were constantly in a state of social comparison (Snyder, 1974). It may be the case that those who engage in high self monitoring behavior may indeed be apprehensive. As such future research may want to explore the relationship between profiles of high Self-Monitors and those high in Apprehension.

Making an even more potent argument for the role of Apprehension in the recognition of emotions, is its contribution to the recognition of fear. Despite the fact that correlations were overall generally low to moderate, the recognition of fear was the only emotion that was reliably predicted by some combination of personality variables as measured by the 16PF. In creating a profile, it appears that personalities that reflect high Dominance and Self Reliance and low Apprehension, are especially prone to missing those facial cues in others that reflect fear. These traits all have as a common denominator a lack of concern for the other. They suggest a person who is bold, self assured and assertive, who aims to satisfy his/her own needs with little input or regard for others. This person may lack social skills such as empathy and perspective taking as he/she can be both authoritative and controlling as in the case of the Dominant personality or a self sufficient loner as is the case with the Self-Reliant personality. Whatever the case these individuals are so focused on achieving their own goals that they may overlook the needs and views of others (Cattell & Schuerger, 2003).

Being dominant and lacking apprehension makes these individuals potential bullies on the playground or in the boardroom. Their aggressive stance is likely to make them unappealing friends or associates and social interaction with these individuals is likely to be avoided. The resulting lack of interpersonal contact however may contribute even further to their inability to recognize distress signals in others and respond appropriately. It is not certain why fear was the

only emotion that was reliably predicted by the 16PF, however the findings add significantly to the area of emotional recognition. This study seems to suggest that certain personality traits may be related to the recognition of certain emotions rather than all emotions. The implications for future study may be to find with a larger sample, which other personality traits may be implicated in the recognition of the other emotions

Limitations

Some cautionary notes are worth considering in evaluating the strength and generalizability of these findings. Firstly, the small sample size along with the small number of participants in many of the colleges may have hampered more significant between group findings. This restriction on the sample size also created somewhat homogenous groups in terms of gender composition. Liberal Arts students were primarily female and Engineering students male, as such, some of the personality differences accounted for by college major may actually be embedded in gender differences. Although the homogeneity of the sample is somewhat representative of the actual makeup of the student body, it is suggested for future study that greater heterogeneity be established.

A second limitation of the study lies in the fact that participants were grouped according to college and not academic major. Within the Liberal Arts college for example, students' majors included psychology, economics and political sciences. Based on Holland's occupation-personality typology, the psychology and political science major may be more social oriented whereas the economics major may be more conventional. As such it is possible that there may be within group differences that were not accounted for in this study. Future studies may want to focus on differences between specific college majors.

Another threat to internal validity was the lack of uniformity in the conducting of the study. Some participants completed the personality questionnaire under semi timed conditions in the examiner's presence whereas others took the questionnaire away and completed it at their leisure. This flexibility may have afforded some participants to think longer on their answers before responding, whereas those tested under more time restricted settings may have been less thoughtful of their responses. Similarly, some participants viewed the pictures displaying emotions on a large over head screen in a group setting, whereas others completed it individually, while viewing the faces on a much smaller computer screen.

A final consideration regarding the dated Ekman photographs needs to be made. It is possible that the dated features of the faces expressing the emotion (including hairstyles, sideburns) may distract the viewer from focusing on the actual emotions expressed by the faces. The standardization of more contemporary pictures could reduce this potential confound. Modern pictures should also reflect the multicultural nature of most 21st century societies to allow for more valid research on emotional recognition.

References

Adams, K. & Markham, R. (1991). Recognition of affective facial expressions by children and adolescents with and without mental retardation. *American Journal on Mental Retardation, 96,1,* 21-28.

Cattell, H E.P.,& Schuerger, J.M. (2003). *Essentials of 16PF Assessment.* New Jersey: John Wiley & Sons Inc.

Darwin, C. (1965). *The expression of the emotions in man and animals.* Chicago: University of Chicago Press.

Dimitrovsky, L., Spector, H., Levy-Shift, R., & Vakil, E. (1998). Interpretation of facial expressions of affect in children with learning disabilities with verbal or nonverbal deficits. *Journal of Learning Disabilities, 31, 3, 286-294.*

Dimitrovsky, L., Spector, H., & Levy-Shift, R. (2000). Stimulus gender and emotional difficulty level: Their effect on recognition of facial expressions of affect in children with and without LD. *Journal of Learning Disabilities, 33, 5, 410-417.*

Eiland, R., & Richardson, D. (1976). The influence of race, sex and age on judgments of emotion portrayed in photographs. *Communication monographs, 43, 167-175.*

Ekman, P., Friesen, W.V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis,I., Heider, K. et al. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53,* 712-717.

Ekman, P. (2003). *Emotions Revealed.* New York: Henry Holt and Company.

Elfenbein, H. A., Marsh, A. A.,& Ambady, N. (2002). Emotional intelligence and the recognition of emotion from facial expressions. In L. F. Barrett & P. Salovey (Eds). *Wisdom in feeling: Psychological processes in emotional intelligence* (pp.

37-59). New York, NY: Guilford Press, 2002. [Chapter]

Elfenbein, H. A., & Ambady, N. (2003). Universals and cultural differences in recognizing emotions. *Current Directions in Psychological Science, 12*(5), 159-164.

Elfenbein, H. A., & Ambady, N. (2003). When familiarity breeds accuracy: Cultural exposure and facial emotion recognition. *Journal of Personality and Social Psychology, 85*, 276-290.

Feinberg, T. E., Rifkin, A. & Schaffer, C. (1986). Facial discrimination and emotional recognition in schizophrenia and affective disorders. *Archives of General Psychiatry, 43(3),* 276-279. Abstract obtained from PsycINFO.

Fridlund, A.J. (1997). The new ethology of human facial expressions. In J.A. Russell & J.M. Fernandez-Dols (Eds). *The psychology of facial expression (pp. 103-129).* Paris: Cambridge University Press.

Hall, J. (1978). Gender effects in decoding nonverbal cues. *Psychological Bulletin, 85* (4), 845-857.

Izard, C.E. (1971). *The face of emotion.* New York: Appleton-Century-Crofts.

Izard, C.E. (1994). Inate and universal facial expressions: Evidence from developmental and cross-cultural research. *Psychological Bulletin, 115(2)*, 288-299.

Kucharska-Pietura, K., Nikolaou, V., Masiak, M., & Treasure, J. (2004). The recognition of emotion in the faces and voice of anorexia nervosa. *International Journal of Eating Disorders, 35 (1)*, 42-47. [Abstract]

Lorr, M., & Strack, S. (1994). Personality profiles of police candidates. *Journal of Clinical Psychology, 50 (2)*, 200-207.

Mann, L.S., Wise, T., Trinidad, A., & Kohanski, R. (1994). Alexithymia, affect recognition, and

the five-factor model of personality in normal subjects. *Psychological Reports, 74*, 563-567.

Matsumoto, D., LeRoux, J., Wilson-Cohn, C., Raroque, J., Kooken, K., Ekman, P., et al. (2000). A new test to measure emotion recognition ability: Matsumoto and Ekman's Japanese and Caucasian brief affect recognition test (JACBART). *Journal of Nonverbal Behavior, 24,* 179-209.

McAlpine, C., Singh, N., Kendall, K., & Ellis, C. (1992). Recognition of facial expressions of emotion by persons with mental retardation- A matched comparison study. *Behavior Modification, 16,* 543-558.

Mehrabain, A., & Ferris, S.R. (1967). Inference of attitudes from nonverbal communication in two channels. *Journal of Consulting Psychology, 31,* 248-252.

Morgado, I.A., Cangemi, J.P., Miller, R., & O'Connor, J. (1992). Accuracy of decoding facial expressions in those engaged in people oriented activities vs. those engaged in non-people oriented activities. *Interamerican Journal of Psychology, 26*, 63-70.

Nowicki, S., & Hartigan, M. (1988). Accuracy of facial affect recognition as a function of locus of control orientation and anticipated interpersonal interaction. *The Journal of Social Psychology, 128 (3)*, 363-372.

Persad, S.M., & Polivy, J. (1993). Differences between depressed and nondepressed individuals in the recognition of and response to facial emotional cues. *Journal of Abnormal Psychology, 102 (3)*, 358-368.

Plante, T.G., Manuel, G., & Tandez, J. (1996). Personality characteristics of successful applicants to the priesthood. *Pastoral Psychology, 45,* 29-39.

Pollock, S.D., Cicchetti, D., Hornung, K., & Reed, A. (2000). Recognizing emotions in

faces: Developmental effects of child abuse and neglect. *Developmental Psychology, 36*, 679-688.

Rossier, J., Meyer de Stadelhofen, F., & Berthoud, S. (2004). The hierarchical structures of the NEO PI-R and the 16 PF 5. *European Journal of Psychological Assessment, 20*(1), 27-38.

Rotter, N., & Rotter, G. (1988). Sex differences in the encoding and decoding of negative facial emotions. *Journal of Nonverbal Behavior, 12*(2), 139-148.

Russell, J.A. (1994). Is there universal recognition of emotion from facial expression? A review of the cross-cultural studies. *Psychological Bulletin, 115 (1),* 102-141.

Schuerger, J.M. (1995). Career assessment and the sixteen personality factor questionnaire. *Journal of Career Assessment, 3* (2), 157-175.

Simon, E.W., Rosen, M., Grossman, E., & Pratowski, E. (1995). The relationships among facial emotion recognition, social skills, and quality of life. *Research in Developmental Disabilities, 16* (5), 383-391.

Snyder, M. (1974). Self-monitoring of expressive behavior. *Journal of Personality & Social Psychology, 30,* 526-537.

Tremblay, C., Kirouac, G., & Dore, F.Y. (1987). The recognition of adults' and children's facial expressions of emotions. *The Journal of Psychology, 121 (4),* 341-350.

Table 1

Means and Standard Deviations for 16 PF Primary Factor Sten Scores by Gender

	Males (n = 35)		Females (n = 17)		
16PF Primary Factors	M	SD	M	SD	M. diff
A: Warmth	4.8	1.5	5.9	2.0	-1.1*
B: Reasoning	6.6	1.6	6.6	1.5	0.0
C: Emotional stability	4.8	1.8	4.6	1.3	0.2
E: Dominance	4.8	1.5	4.3	1.5	0.5
F: Liveliness	5.9	1.7	6.4	1.8	-0.5
G: Rule consciousness	4.1	1.6	3.8	1.4	0.3
H: Social boldness	4.9	1.8	6.1	2.2	-1.2*
I: Sensitivity	5.5	1.6	5.7	2.1	-0.2
L: Vigilance	6.6	1.5	6.1	1.4	0.5
M: Abstractedness	6.5	1.3	5.6	1.8	0.9*
N: Privateness	6.2	1.5	4.6	1.7	1.6**
O: Apprehension	6.1	1.4	6.0	1.0	0.1
Q1: Openness to change	5.6	1.6	6.0	1.3	-0.4
Q2: Self reliance	5.9	1.3	5.2	1.9	0.7
Q3: Perfectionism	4.2	1.4	4.6	1.5	0.4
Q4: Tension	5.5	1.2	5.2	1.0	0.3

*$p < .05$. **$p < .01$.

Table 2

Means and Standard Deviations for 16PF Global Factor Sten Scores by Gender

	Males (n = 35)		Females (n = 17)		
16PF Factor	M	SD	M	SD	M. diff
Extraversion	4.9	1.7	6.4	1.7	-1.5**
Anxiety	6.4	1.4	6.2	1.0	0.2
Tough mindedness	5.4	1.5	5.2	1.5	0.2
Independence	5.2	1.4	5.2	1.4	0.0
Self control	4.1	1.9	4.2	1.4	-0.1

*p < .05. **p < .01.

Table 3

Means and Standard Deviations for 16PF Primary Factor Sten Scores by College

	LA (n = 15)		SCI (n = 5)		ENG (n = 7)		CAIS (n = 10)		ASTEC (n = 5)		BUS (n = 6)		IMAS (n = 4)	
16PFPrimary Factor	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
A: Warmth	5.5	1.9	5.2	1.9	3.7	1.4	4.6	1.6	6.2	1.6	5.5	1.2	5.8	1.5
B: Reasoning	6.4	1.5	7.8	1.1	7.1	1.9	6.8	1.4	6.2	1.9	6.3	1.4	5.3	1.3
C: Emot. stability	4.9	1.7	5.2	1.8	4.6	1.7	4.4	1.5	5.0	1.7	5.0	1.8	3.8	1.3
E: Dominance	4.5	1.6	4.0	1.0	4.3	1.9	5.0	1.7	5.0	1.6	5.2	1.0	4.3	1.7
F: Liveliness	5.7^{abc}	1.4	7.0^{abc}	1.9	4.9^{a}	1.3	5.3^{ab}	1.5	7.4^{bc}	1.1	6.5^{abc}	1.9	8.0^{c}	1.4
G: Rule conscious	3.4^{ab}	1.1	4.6^{ab}	2.1	4.7^{ab}	1.1	4.0^{ab}	1.6	4.2^{ab}	1.3	5.2^{b}	1.3	2.5^{a}	1.3
H: Social boldness	5.5^{ab}	2.1	5.0^{ab}	1.6	3.7^{a}	1.1	4.6^{ab}	2.3	5.6^{ab}	2.4	6.2^{ab}	1.7	7.3^{b}	1.3
F: Sensitivity	5.7	2.2	5.2	1.6	5.1	1.8	6.0	1.9	4.8	0.8	5.7	1.5	5.3	1.3
L: Vigilance	6.0	1.3	6.8	1.3	6.9	1.6	6.7	1.7	7.2	1.3	6.0	1.8	6.5	1.3
M: Abstractedness	5.7	1.8	5.8	1.3	7.6	1.5	6.2	0.9	6.0	0.7	5.7	2.1	7.5	0.6
N: Privateness	4.8	2.0	5.6	1.9	7.3	1.1	5.8	1.7	6.4	1.1	5.3	1.4	5.5	1.3
O: Apprehension	5.9	1.0	5.6	1.1	7.1	0.7	6.0	2.1	6.6	1.1	5.8	0.8	5.8	1.0
Q1: Open to change	6.1	1.2	5.0	1.0	4.7	2.0	6.4	1.8	5.4	1.1	5.2	1.2	6.8	0.5
Q2: Self reliance	5.4	1.8	5.8	0.8	6.6	1.9	6.0	1.2	4.4	1.5	5.8	1.0	5.5	1.7
Q3: Perfectionism	4.2	1.1	4.8	1.9	4.1	2.0	4.4	1.5	4.0	1.9	5.0	1.1	4.0	0.8
Q4: Tension	5.5	1.4	4.8	0.4	5.4	1.3	5.5	1.0	6.4	1.1	4.8	1.3	5.0	0.0

Note. LA = Liberal Arts; SCI = Science; ENG = Engineering; CAIS = Computing and Information Sciences; ASTEC = Applied Science & Technology; BUS = Business; IMAS = Imaging Arts and Sciences. Means sharing the same letter in the superscript do not differ from each other in the Student-Newman-Keuls comparison.

Table 4

Means and Standard Deviations for 16PF Global Factor Sten Scores by College

	LA (n = 15)		SCI (n = 5)		ENG (n = 7)		CAIS (n = 10)		ASTEC (n = 5)		BUS (n = 6)		IMAS (n = 4)	
16PFGlobal Factor	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Extraversion	5.7^{ab}	1.8	5.6^{ab}	1.7	3.4^{a}	1.3	4.6^{ab}	1.6	6.4^{b}	1.9	5.8^{ab}	1.6	6.8^{b}	1.0
Anxiety	6.1	1.3	5.8	1.1	7.0	0.6	6.5	1.5	7.2	1.3	5.7	1.5	6.3	1.3
Tough mindedness	5.1	1.4	6.0	1.2	6.0	2.0	5.0	1.7	5.6	0.5	5.5	1.5	4.8	0.5
Independence	5.2	1.4	4.6	0.5	4.4	1.4	5.5	1.8	5.4	1.3	5.7	0.8	5.8	1.3
Self control	4.1	1.0	4.4	1.1	4.4	1.3	4.3	1.3	4.0	1.6	4.8	1.2	2.5	1.3

Note. LA = Liberal Arts; SCI = Science; ENG = Engineering; CAIS = Computing and Information Sciences; ASTEC = Applied Science & Technology; BUS = Business; IMAS = Imaging Arts and Sciences. Means sharing the same letter in the superscript do not differ from each other in the Student-Newman-Keuls comparison.

Table 5

Means and Standard Deviations for Interpersonal Skills by College

	LA (n = 15)		SCI (n = 5)		ENG (n = 7)		CAIS (n = 10)		ASTEC (n = 5)		BUS (n = 6)		IMAS (n = 4)	
Skill/Trait	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Social Adjustment	4.8	0.8	4.5	0.7	3.9	0.5	4.5	0.8	4.6	0.7	4.9	0.7	4.7	0.6
Occ. Adjustment	4.8	0.9	4.8	0.9	4.0	0.6	4.3	0.8	4.9	0.7	4.7	0.9	4.6	0.5
Emot. Adjustment	4.4	0.9	4.4	0.7	3.5	0.6	4.0	0.7	3.7	0.7	4.5	1.1	3.8	0.6
Emot. Expressivity	5.4	0.9	4.7	0.9	4.3	0.9	5.0	1.1	5.3	0.9	5.1	0.8	5.7	0.5
Social Expressivity	5.6^{ab}	1.2	5.4^{ab}	0.9	4.0^{a}	1.0	5.1^{ab}	0.9	5.5^{ab}	0.6	5.6^{ab}	1.2	6.6^{b}	0.4
Emot. Sensitivity	5.8^{b}	0.9	5.1^{ab}	0.9	4.2^{a}	1.3	5.5^{ab}	1.0	5.8^{b}	0.4	$5.3^{a\,b}$	0.9	6.2^{b}	0.6
Social Sensitivity	5.0	0.9	5.0	0.7	5.5	0.4	5.1	1.0	5.5	0.4	5.0	0.6	4.8	0.4
Emotional Control	5.1	0.8	5.9	0.4	5.7	0.7	5.5	1.2	5.3	0.8	5.3	0.8	5.0	0.6
Social Control	5.1	0.8	4.9	0.6	4.5	0.4	5.1	0.8	4.8	0.5	5.3	0.4	5.1	0.7
Social Skills Inv.	5.8^{ab}	1.0	6.2^{ab}	1.1	4.8^{a}	0.4	5.3^{ab}	0.7	6.3^{ab}	1.2	6.1^{ab}	0.7	6.6^{b}	1.1
Self Esteem	5.0	0.5	4.9	0.6	4.2	0.3	4.8	0.7	5.1	0.4	5.1	0.7	5.1	0.5
Empathy	5.2^{ab}	0.8	5.1^{ab}	0.8	4.2^{a}	0.6	4.7^{ab}	0.6	5.1^{ab}	0.7	5.3^{ab}	0.8	5.7^{b}	0.5
Leadership	4.9	0.7	5.2	0.6	4.4	0.6	4.7	0.6	5.1	0.7	5.2	0.6	4.9	0.4
S'thing about me	5.2	1.1	4.9	0.5	4.9	0.8	5.3	0.9	5.2	0.5	5.4	0.7	5.9	0.4

Note. LA = Liberal Arts; SCI = Science; ENG = Engineering; CAIS = Computing and Information Sciences; ASTEC = Applied Science & Technology; BUS = Business; IMAS = Imaging Arts and Sciences. Means sharing the same letter in the superscript do not differ from each other in the Student-Newman-Keuls comparison.

Table 6

Correlations of 16PF Primary Factor Sten Scores with Emotional Recognition Performance

	Emotions							
16PF Primary Factor	Happy	Sad	Angry	Surprise	Fear	Disgust	Neutral	Total
A: Warmth	-	-.27†	-	-	.25†	-	-	-
B: Reasoning	-	-	-	-	-	-	-	-
C: Emot. stability	-	-	-	-	-	-	-	-
E: Dominance	.25†	-	-	-	-.37**	-	-	-
F: Liveliness	.27†	-	-	-	.26†	.27†	-	-
G: Rule conscious	-	-	-	-	-	-	-	-
H: Social boldness	.27†	-	-	-	-	-	-.25†	-
I: Sensitivity	-	-	-	-	-	-	-	-
L: Vigilance	-	.26†	-	-	-	-	-	-
M: Abstractedness	-	-	-	-	-	-	-	-
N: Privateness	-	-	-	-	-	-	-	-
O: Apprehension	-	-	-	.27†	.25†	-	.31*	.29*
Q1: Open to change	-	.26†	-	-	-	.24†	-	-
Q2: Self-reliance	-	-	-	-	-.44**	-	-	-
Q3: Perfectionism	.33*	-	-	-	-	.28*	-	-
Q4: Tension	.25†	-	-	-	-	-	-	-

Note. N = 52. Non significant correlation coefficients were omitted.

*p < .05. **p < .01. †p < .10.

Table 7

Correlations of 16PF Global Factor Sten Scores with Emotional Recognition Performance

	Emotions							
Factor	Happy	Sad	Angry	Surprise	Fear	Disgust	Neutral	Total
Extraversion	-	-	-	-	.34*	-	-	-
Anxiety	-	-	-	-	-	-	.32*	-
Tough mindedness	-	-	-	-	-	-	-	-
Independence	.29*	-	-	-	-	-	-	-
Self-control	-	-	-	-	-	-	-	-

Note. N = 52. Non significant correlation coefficients were omitted

*p < .05. **p < .01. †p < .10.

Table 8

Correlations of Interpersonal Skills with Emotional Recognition Performance

	Emotions							
Traits/Skills	Happy	Sad	Angry	Surprise	Fear	Disgust	Neutral	Total
Social Adjustment	-	-.	-	-	-	-	-	-
Occ. Adjustment	-	-	-	-	-	-	-	-
Emot. Adjustment	-	-	-	-	-	-	-	-
Emot. Expressivity	.38**	-	-	-	-	-	-	-
Social Expressivity	.31*	-	-	-	-	-	-.29*	-
Emot. Sensitivity	-	-	-	-	.28*	-	-	-
Social Sensitivity	-	-	-	-	-	-	.38**	-
Emotional Control	-	-	-	-	-	-	-	-
Social Control	-	-	-	-	-	-	-	-
Social Skills Inv	-	-	-	-	-	-	-	-
Self Esteem	-	-	-	-	-	-	-	-
Empathy	-	-	-	-	.32*	-	-.29*	-
Leadership	.30*	-	-	-	-	-	-	-
S'thing about me	.29*	-	-	-	-	.34*	-	-

Note. N = 52. Non significant correlation coefficients were omitted.

*p < .05. **p < .01.

Table 9

Regression of the recognition of Fear on to the 16 PF Primary Factors

Factor	R	R^2	Beta	t-value
A: Warmth			-.03	-.14
B: Reasoning			-.02	-.17
C: Emotional stability			.20	1.32
E: Dominance			-.36	-2.32*
F: Liveliness			.09	.65
G: Rule consciousness			-.23	-1.52
H: Social boldness			.15	.98
I: Sensitivity			.29	1.94
L: Vigilance			.14	1.03
M: Abstractedness			-.21	-1.32
N: Privateness			.24	1.52
O: Apprehension			.42	2.49*
Q1: Openness to change			.24	1.65
Q2: Self-reliance			-.44	-2.34*
Q3: Perfectionism			.05	.37
Q4: Tension			.01	.04
Overall	.74	.55		

* $p < .05$

Figure 1

16PF Global Factors and their contributing Primary Scales

Extraversion	Anxiety	Tough Mindedness	Independence	Self-Control
A: Warmth	C-:Reactive	A-: Reserved	E: Dominant	F-: Serious
F: Lively	L:Vigilant	I-: Unsentimental	H: Shy	G: Rule-Conscious
H: Bold	O:Apprehensive	M-:Practical	L: Vigilant	M-: Practical
N-: Forthright	Q4:Tense	Q1-:Traditional	Q1: Traditional	Q3: Perfectionistic
Q2-Group-Oriented				

Figure 2

Interpersonal Skills and their contributing 16PF Primary Factors

Interpersonal Skill	Primary Factors
Social Adjustment	H, E, L-, O-, Q2-, C, I
Occupational Adjustment	C, O-, E-, L-, A
Emotional Adjustment	O-, C, Q4-, L-, M-
Emotional Expressivity	N-, H, G-, E, Q4
Social Expressivity	H, F, N-, Q1
Emotional Sensitivity	A, Q1
Social Sensitivity	O, A, C-, Q1-, H-, Q4
Emotional Control	O-, N, B
Social Control	H, L-, Q1, E, Q3, B
Social Skills Inventory	H, F, A, B
Self Esteem	C, H, O-, M-, A, Q1, N
Empathy	H, L-, A, C, Q1, Q4-, F
Leadership	H, M-, F, Q3, C, Q4-, E, I-, B, Q2-
Something about me	H, Q3, M, E, Q1

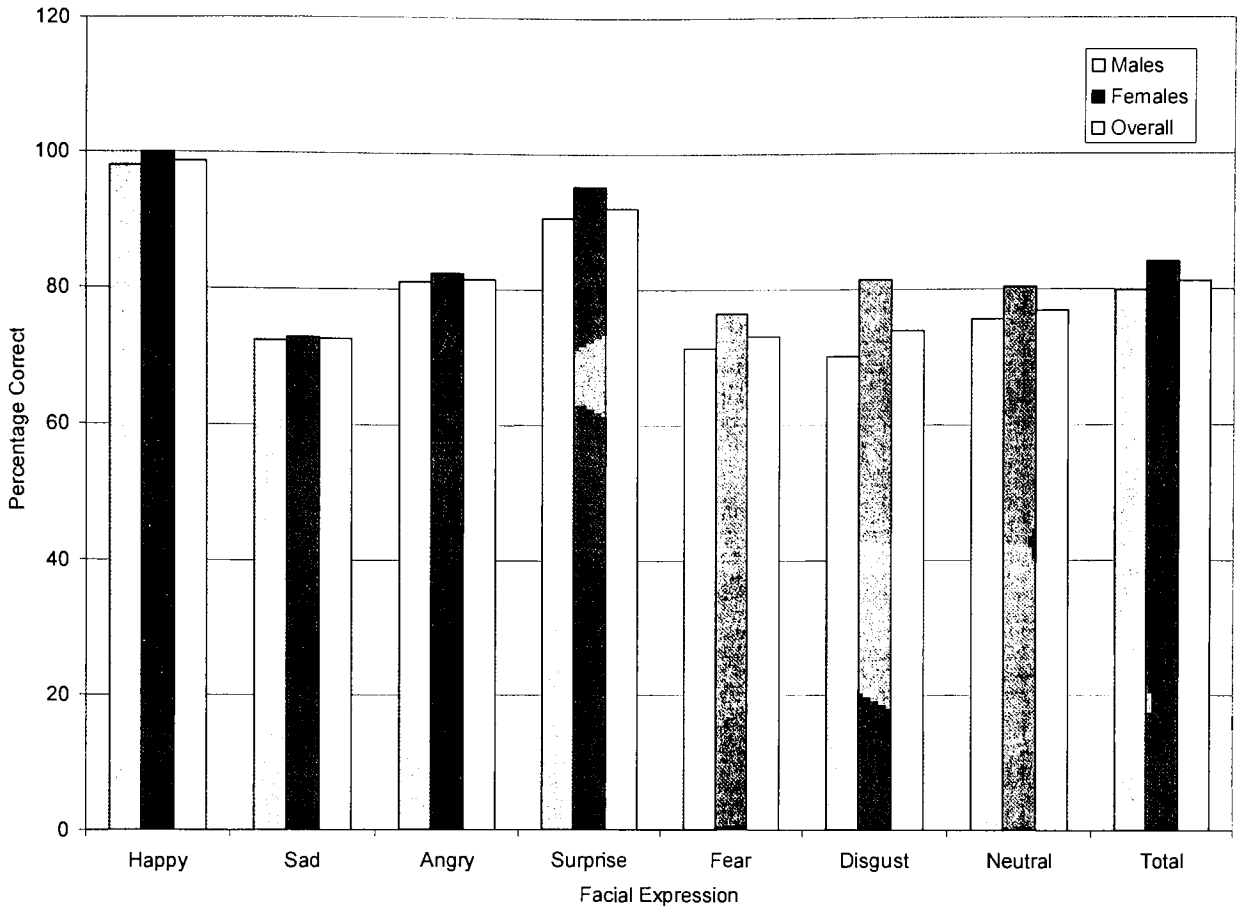

Figure 3. Mean percentage accuracy in emotional recognition ability by gender.

Appendix

Response sheet for AEFER task.

1.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
2.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
3.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
4.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
5.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
6.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
7.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
8.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
9.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
10.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
11.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
12.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
13.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
14.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
15.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
16.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
17.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
18.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
19.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**
20.	**Happy**	**Sad**	**Angry**	**Surprise**	**Fear**	**Disgust**	**Neutral**

21. Happy Sad Angry Surprise Fear Disgust Neutral

22. Happy Sad Angry Surprise Fear Disgust Neutral

23. Happy Sad Angry Surprise Fear Disgust Neutral

24. Happy Sad Angry Surprise Fear Disgust Neutral

25. Happy Sad Angry Surprise Fear Disgust Neutral

26. Happy Sad Angry Surprise Fear Disgust Neutral

27. Happy Sad Angry Surprise Fear Disgust Neutral

28. Happy Sad Angry Surprise Fear Disgust Neutral

29. Happy Sad Angry Surprise Fear Disgust Neutral

30. Happy Sad Angry Surprise Fear Disgust Neutral

31. Happy Sad Angry Surprise Fear Disgust Neutral

32. Happy Sad Angry Surprise Fear Disgust Neutral

33. Happy Sad Angry Surprise Fear Disgust Neutral

34. Happy Sad Angry Surprise Fear Disgust Neutral

35. Happy Sad Angry Surprise Fear Disgust Neutral

36. Happy Sad Angry Surprise Fear Disgust Neutral

37. Happy Sad Angry Surprise Fear Disgust Neutral

38. Happy Sad Angry Surprise Fear Disgust Neutral

39. Happy Sad Angry Surprise Fear Disgust Neutral

40. Happy Sad Angry Surprise Fear Disgust Neutral